

Claims

1. Analytical system for analysing and controlling a production process for glass products, the production process comprising a shaping process and a cooling process and
5 the analytical system comprising an infrared-sensitive measurement system and a processor communicating therewith, the infrared-sensitive measurement system being equipped to measure infrared radiation originating from hot glass products immediately after the shaping process for the glass products and the processor being equipped to determine a heat distribution in the glass products on the basis of information determined by the
10 measurement system, characterised in that the infrared-sensitive measurement system (30) is sensitive only to radiation in the Near Infra Red (NIR) region.
2. Analytical system according to Claim 1, characterised in that the infrared-sensitive measurement system (30) is sensitive to wavelengths of between 900 and 2800 nanometers.
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3. Analytical system according to one of the preceding claims, characterised in that the infrared-sensitive measurement system (30) comprises at least one infrared sensor (32) and at least one Near Infra Red filter (34).
- 20 4. Analytical system according to Claim 3, characterised in that the transmission characteristic of the Near Infra Red filter (34) is dependent on the colour and the specific material composition of the glass products.
5. Analytical system according to one of the preceding claims, characterised in that the
25 processor (38) is equipped to carry out the following step:
 - (a) subdividing an image of the glass products (18) into at least two measurement regions (40, 41, 42, 43, 44).
6. Analytical system according to Claim 5, characterised in that the processor (38) is
30 equipped to carry out the following step:
 - (b) determining average intensity values for the different measurement regions for consecutive glass products (18).

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ART 34 AMDT

7. Analytical system according to Claim 6, characterised in that the processor (38) is equipped to carry out the following steps:

- (c) determining, for at least two measurement regions, a current average value from the average intensity values determined for a number of consecutively shaped glass products (18) over time;
- (d) recording, for each of the at least two measurement regions, any deviation between the current intensity or the current average intensity and a reference value;
- (e) comparing any deviations between the at least two measurement regions;
- (f) generating an error signal in the event of any deviations.

8. Analytical system according to Claim 7, characterised in that the error signal is indicative of a deviating glass thickness if a positive deviation occurs in a first measurement region and a negative deviation occurs in a second measurement region.

9. Analytical system according to Claim 7, characterised in that the error signal is indicative of a deviating glass temperature if a positive deviation occurs for all measurement regions or a negative deviation occurs for all measurement regions.

10. Analytical system according to Claim 6, characterised in that the processor (38) is equipped to carry out the following steps for at least one measurement region:

- (c) determining a machine plot by plotting a graph of the average intensity values as a function of the consecutive glass products (18), i.e. stations (14);
- (d) determining a cooling plot by means of an optimum fit curve;
- (e) recording any deviations between a current machine plot and the cooling plot;
- (f) generating an error signal in the event of any deviations.

11. Analytical system according to Claim 10, characterised in that the error signal contains information on a possible cause during the shaping process.

12. Analytical system according to Claims 1 - 3, characterised in that the processor (38) is equipped to record local discontinuities in the heat distribution in a glass product.

13. Method for analysing and controlling a production process for glass products, comprising:

- a) providing measurement means for determining a heat distribution in hot glass products;
- 5 b) measuring infrared radiation originating from the hot glass products before these enter a cooling oven;
- c) determining a heat distribution in glass products on the basis of the infrared radiation measured,

characterised in that the measurement means (30) are sensitive only to radiation from the
10 Near Infra Red region.

14. Method according to Claim 13, characterised in that the measurement means (30) are sensitive only to wavelengths between 900 and 2800 nanometres.

15 15. Method according to Claim 13, characterised in that the measurement means (30) comprise at least one infrared sensor (32) and at least one Near Infra Red filter (34).

16. Method according to one of Claims 13 - 15, characterised in that the method comprises the following step:

- 20 (d) subdividing an image of the glass products (18) into at least two measurement regions (40, 41, 42, 43, 44).

17. Method according to one of Claims 13 - 16, characterised in that the method comprises the following step:

- 25 (e) determining average intensity values for the different measurement regions for consecutive glass products (18).

18. Method according to one of Claims 13 - 17, characterised in that the method comprises the following steps:

- 30 (f) determining, for at least two measurement regions, a current average value from the average intensity values determined for a number of consecutively shaped glass products (18);

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ART 34 AMDT

- (g) recording, for each of the at least two measurement regions, any deviation between the current average intensity and a reference value;
- (h) comparing any deviations between the at least two measurement regions;
- (i) generating an error signal in the event of any deviations.

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19. Method according to Claim 18, characterised in that the error signal is indicative of a deviating glass thickness if a positive deviation occurs in a first measurement region and a negative deviation occurs in a second measurement region.

- 10 20. Method according to Claim 18, characterised in that the error signal is indicative of a deviating glass temperature if a positive deviation occurs for all measurement regions or a negative deviation occurs for all measurement regions.

21. Method according to Claim 17, characterised in that the method comprises the
15 following steps:

- (j) determining a machine plot by plotting a graph of the average intensity values as a function of the consecutive glass products (18), i.e. stations (14);
- (k) determining a cooling plot by means of an optimum fit curve;
- (l) recording any deviations between a current machine plot and the cooling plot;
- 20 (m) generating an error signal in the event of any deviations.

22. Method according to one of Claims 13 - 15, characterised in that the method comprises recording local discontinuities in the heat distribution in the glass product.

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